

**REMARKS**

Claims 8 and 12 are amended herein. Support for the amendment is found, for example, at page 18, lines 18-22. No new matter is presented.

**I. Response to Obviousness-type Double Patenting Rejection**

Claims 1 and 3-5 are provisionally rejected on the ground of non-statutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/507,895.

Applicants defer responding to the provisional obviousness-type double patenting rejection for the time being.

**II. Response to Claim Rejections under 35 U.S.C. § 103**

**A. Hirai et al**

Claims 1-3, 6-8, 10-14 and 18 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Hirai et al (U.S. Patent No. 6,051,614) for the reasons of record.

Applicants respectfully traverse the rejection.

Independent claim 1 defines a photocatalyst comprising a capsule structure which comprises a cadmium compound shell and void and having an average particle diameter of 100 nm or less.

Applicants clarify that the void recited in claim 1 is contained in the capsule structure as shown in the Attached Sheet 1 (not between the outer and inner surfaces of the cadmium compound shell as previously indicated).

Moreover, the capsule structure comprising a cadmium compound shell is clearly explained in Fig. 1(B) of the present invention (see the Attached Sheet 2).

On the other hand, the structure of the catalyst of Hirai et al is described in the Attached Sheet 3.

In Hirai et al, there is a particle (which may have hollow construction). A catalyst (component) is supported on the particle. Hirai et al does not produce a photocatalyst having a hollow structure. Hirai et al only discloses that a catalyst (component) is supported on a hollow body (i.e., particle having hollow construction). The hollow body of Hirai et al itself is known.

In the present invention, the photocatalyst itself has a hollow structure, and a particle having hollow construction is not used, which is different from Hirai et al. Further, there is no apparent reason which would lead one of ordinary skill to modify the disclosure of Hirai et al to fashion a photocatalyst having the claimed structure.

Specifically, Hirai et al does not disclose a photocatalyst comprising a void as claimed in claim 1.

Accordingly, Applicants submit that the structure of the photocatalyst of the present invention is entirely different from that of Hirai et al. For at least this reason, the present invention is not anticipated by Hirai et al.

Independent claim 8 is amended to recite, “dropping a solution of a cadmium salt into a solution of a sodium compound to first form a microscopic solid phase of cadmium hydroxide, which then turns into a cadmium compound instantaneously to form the shell of the capsule of the photocatalyst” as described at page 18, lines 18-22 of the specification.

On the other hand, Hirai et al does not teach, suggest or even mention “dropping” a solution of a cadmium salt into a solution of a sodium compound. Also, none of the working examples of Hirai et al employs a solution of a cadmium salt. Thus, for this additional reason,

one of ordinary skill in the art would not have been motivated to modify the disclosure of Hirai et al with a reasonable expectation of success.

Independent claims 8 and 12 are amended herein to recite a step of obtaining a photocatalyst comprising a capsular structure, which comprises a cadmium shell and void. Hirai et al does not teach or suggest a step of obtaining a photocatalyst comprising a capsular structure which comprises a cadmium shell and void and therefore does not render the present invention obvious.

Regarding the arguments with respect to claims 12-18, the Examiner asserts that from the teaching of Hirai et al at column 4, line 66 to column 5, line 3, one of ordinary skill in the art would select the necessary starting materials to obtain cadmium sulfide.

However, that is not the standard for evaluating obviousness. Rather, the pertinent question is whether the reference suggests the desirability to do so. In this regard, the Examiner has not made a *prima facie* showing of obviousness. Hirai et al generally teaches, “an aqueous dispersion of particles of a metal sulfide such as copper sulfide, cobalt sulfide, nickel sulfide or cadmium sulfide can be obtained by treating an aqueous solution of a metal salt corresponding to the desired metal species with a sulfide-forming agent such as sodium thiosulfate, sodium sulfide, ammonium sulfide, hydrogen sulfide or zirconium sulfide.” However, claim 12 of the present application requires more. That is, claim 12 requires admixing a solution of a sodium compound in a suspension of particles of a cadmium compound. Hirai et al teaches an aqueous solution of a metal salt and not a suspension. Therefore one of ordinary skill in the art would not have been motivated to modify the disclosure of Hirai et al with a reasonable expectation of success. For this additional reason the present invention is not rendered obvious.

Accordingly, Applicants respectfully request withdrawal of the §103 obviousness rejection.

**B. Bühler et al**

Claims 1-8, 12 and 19-23 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Bühler et al (U. S. Patent No. 4,484,992).

Applicants respectfully traverse the rejection.

As stated above, independent claim 1 defines a photocatalyst comprising a capsule structure which comprises a cadmium compound shell and void and having an average particle diameter of 100 nm or less. Independent claims 8 and 12 are amended herein are amended to recite a step of obtaining a photocatalyst comprising a capsular structure, which comprises a cadmium compound shell and void.

Bühler et al fails to disclose, teach or otherwise suggest a capsular structure comprising a cadmium compound shell and a void as claimed. Moreover, the Examiner has not pointed to any teaching in the art which might indicate that Bühler et al implicitly or inherently teaches a capsule structure comprising a cadmium compound shell and a void as claimed, or that would motivate one of ordinary skill to modify the disclosure so as to achieve the claimed capsular structure with a reasonable expectation of success.

Further, there is no reasonable basis for asserting that Bühler et al discloses the claimed capsular structure comprising a cadmium compound shell and a void. This is because Bühler et al does not teach or suggest the characteristic process for obtaining the capsular structure comprising a cadmium compound shell and void, and because Bühler et al does not disclose, mention or suggest that the cadmium sulfide particles coated with a noble metal have the

required capsular structure. In Bühler et al, cadmium sulfide and titanium dioxide, etc., are exemplified as “a semiconductor powder” (see, e.g., column 2, lines 28-30). For, example, Example 14 of Bühler et al discloses that Cd element and platinum are supported on CdS. The CdS is simply used as a catalyst (i.e., host) for supporting platinum (and Cd) thereon. Thus, Bühler et al is directed to a totally different technical concept from that of the present invention.

Moreover, the photocatalyst of the present invention having a capsular structure as recited in the present claims allows for the use of visible light an inexhaustible source and clean source of natural energy for its photocatalytic activity, is nontoxic and has a long life as compared to a photocatalyst composed of simple particles. See e.g., page 9, paragraphs 3-5. Further, the data provided in the specification sufficiently establishes criticality of the capsular structure of the present invention based upon, for example, a comparison of Example 1 to Comparative Example 3. Buhler et al does not teach, suggest or even mention a capsular structure. Therefore, one of ordinary skill in the art would not have been motivated to modify the disclosure of Buhler et al with a reasonable expectation of success. Claims 19-23 ultimately depend from claim 8 or claim 12 and are patentable for at least the same reasons.

In view of the above, the present invention is patentable over Buhler et al. Accordingly, Applicants respectfully request withdrawal of the rejection.

### **III. Response to Claim Objections**

Claims 9 and 15-17 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 9 depends from claim 8 and is patentable for at least the same reasons. Claims 15-17 depend from claim 12 and are patentable for at least the same reasons.


Accordingly, Applicants respectfully request withdrawal of the objection to the claims.

#### **IV. Conclusion**

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,

  
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**65565**

CUSTOMER NUMBER

Date: August 19, 2008